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Flood Plain Report

Part 2: Regional Flood Plain Developmental Policies

Franklin, Jackson, Jefferson, Perry, & Williamson, Counties, Illinois

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Flood Plain Report

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Part 2: Regional Flood Plain Developmental Policies

Franklin, Jackson, Jefferson, Perry, & Williamson, Counties, Illinois

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June, 1977

Chairmen and County Boards
Mayors and City Councils
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  District Boards

RE: "Flood Plain Report: Part 2: Regional Flood Plain Developmental Policies"

Dear Members:

I am pleased to share with you the Flood Plain Report: Part 2. This document reviews policy considerations concerning structural flood-control techniques such as dams and levees, and non-structural flood control techniques such as building codes and flood insurance. The Report reviews the responsibility and authority of each of the major flood-control agencies active in the Greater Egypt Region, and discusses their recent activities and their potential role in future floods. The report concludes with recommendations for the administration of a Region-wide Flood Management Plan.

Sincerely for the Commission,

Franklyn H. Moreno, AIP
Executive Director

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Illinois Department of Transportation,
Division of Water Resources

for financial assistance in the preparation of this report.

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Chairman and County Board of Franklin County
Chairman and County Board of Jackson County
Chairman and County Board of Jefferson County
Chairman and County Board of Perry County
Chairman and County Board of Williamson County
Mayor and City Council of Benton
Mayor and City Council of Carbondale
Mayor and City Council of Mt. Vernon
Mayor and City Council of Murphysboro
Mayor and City Council of West Frankfort
Chairman and Board of the Rend Lake Conservancy District
Members of the Assembly of Local Governments

In addition, the Regional Commission would like to thank the many public officials, organizations, and citizens too numerous to mention who have offered information and suggestions during the preparation of this report.

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REGIONAL FLOOD PLAIN DEVELOPMENTAL POLICIES

Introduction

During the original settlement of the Region, many towns and cities were founded directly adjacent to streams and creeks to take advantage of transportation and water supply opportunities. Later, many of these settlements were abandoned for higher elevations to avoid flooding. Moving to higher elevation meant safety from frequent flooding, although infrequent flooding still occurred. In rural areas of the Region the native timber was rapidly cleared, producing higher flood potentials for the entire drainage system. Many bottomland farms were abandoned due to repeated flooding.

During the Great Depression of the 1930's, the Illinois State Planning Commission produced a basin plan for the Region. "The Big Muddy River" basin plan advocated the construction of reservoirs and acquisition of flood plains for use by Federal and State agencies. Recreational use was proposed for these acquired lands and constructed lakes. (At the time, the entire Mississippi Bottomlands were regarded as an extension of the Big Muddy River Basin, and plans were formulated for as far south as Cairo.)[1]

In 1961, the Greater Egypt Regional Planning Commission was formed by Franklin, Jackson, Perry, and Williamson Counties. In 1964, "the Comprehensive Plan for the Greater Egypt Region" was produced. Adopted by all members in 1965, the developmental policy for the Region's flood plains was to reserve the bottomlands by land-use regulations for Federal and State acquisition as recreational areas. In 1967, Jefferson County joined the Commission, and a separate comprehensive plan was produced for it. The Jefferson County Comprehensive Plan is compatible with the earlier report; the flood plains are to form a greenbelt within "the dispersed city."

A study group was formed by the Federal government under the River Basins Act to formulate water resources needs on a basin-wide level for the Big Muddy River in the middle 1960's. Chaired by the Corps of Engineers, the study group included representative agencies from the US Department of Agriculture, the US Department of Interior, and the US Department of Transportation. State agencies also participated. The Commission participated as an observer, representing local governments. Greater Egypt suggested development of environmental-recreational corridors on the flood plains to the Big Muddy River Basin Coordinating Committee. In the final report, the environmental-recreational corridors were accepted by the Committee, and were recommended to be a dedicated strip 1,000 feet in depth from high bank to high bank on both sides, and to be a "...mix of public and private ownership with restricted use easements and rights for linear access obtained on those acreages retained in private ownership."

Policy Recommendations of This Flood Plain Report

The Regional Basin-wide Flood Plain Management Program should have developmental policies and action programs that are compatible with the goals and needs of the Region. As expressed in the Regional Comprehensive Plan, the flood plains are to be reserved as open space to be acquired as a greenbelt. However, delineation and identification were begun only recently, and none of the member counties has since supplied the supportive ordinances to enforce the Regional Comprehensive Plan.

Proper usage of flood plains is the responsibility of the local units of government through enforcement of developmental policies and sound management programs. Unwise use will ultimately result in excessive cost to all levels of government.

Structural Measures

Structural measures provide flood protection only within the limits of design criteria. Each levee, reservoir, or channel modification project is designed to protect against a maximum flood with a specified probable recurrence frequency. The effectiveness of structural measures can be impaired and the useful life of the projects shortened by poor management and improper maintenance. Unless local units of government recognize these limitations and provide vigilant management and maintenance, flood losses in the Region will increase. Newly proposed structural measures such as dams and reservoirs, channel modifications, flood proofing, and/or urban development should be rigorously evaluated. The Illinois Fiscal and Economic Commission emphasizes that structural measures are expensive and may be environmentally undesirable.

Local units of government have traditionally applied structural measures on a point-by-point basis. This has led to fragmentary flood plain management throughout the Region. Only one unit of local government in the Region has effectively delineated its flood plain for purposes other than development. Many of the others hope to "create" lands for development by applying structural measures.

Dams and Reservoirs

Dams and reservoirs are located in two physiographic provinces, the Mt. Vernon Hill Country and the Shawnee Hills. None are found on the Salem Plateau. The Mt. Vernon Hill Country's low rolling hills do not lend themselves to construction of efficient flood storage reservoirs because of the large areas which would have to be inundated. The Shawnee Hills section provides good flood storage reservoir sites, but is so close in proximity to the Mississippi River backwater floods as to preclude favorable benefit-cost ratios.

In addition to the design limitations inherent in flood control dams and reservoirs, the following factors influence their effectiveness:

(a) Only the stream on which the dam is located will be fully protected; once another stream joins the protected one, flood protection is diminished.

(b) Sediment transported into, and accumulating in the reservoir lessens flood storage capacities.

(c) Lack of land use controls results in increased run-off and sedimentation into the reservoir, and in flood plain encroachment.

Levees and Walls

The only section of the Region in which levees are used is the Mississippi River Bottoms. Use of levees along the Big Muddy River and its major tributaries would produce much higher flood crests than would occur without the restriction of the flood plain caused by levees.

Favorable cost-benefit ratios for levees are unlikely outside the Mississippi River Bottoms in view of the high initial and maintenance costs and the inherent low productivity of the land on the flood plain, as well as the fact that levees, while protecting bottoms from overflow by the stream, usually aggravate drainage problems on the land they are designed to protect. Levees on the largely undeveloped bottom land of the Big Muddy River System would cause significant environmental change.

Levee protection may actually increase flood damages. The 1973 Spring flood of the Mississippi River was less than a 40-year discharge, but the flood stage set records for height and duration. A major reason for the great height and duration was the constriction of the floodway due to levee construction. By constricting the floodway, huge volumes of water were pushed upward, velocities were increased, and flood waves attenuated.[2]

Channel Modifications

Local units of government and special purpose districts should exercise caution in constructing channel modifications. Channel modifications in the major drainage systems should be carefully designed to minimize environmental changes. Smaller drainage systems such as those in urban areas and in open agricultural areas would not be as environmentally damaging or as expensive, if channelized.

The urban areas generally contain numerous small upland watersheds, usually less than one square mile in area; many of these small watersheds have already had their drainage greatly altered. Streets and roads replaced small watercourses; sometimes drainage ditches and sewers were provided to handle storm water, often they were not. During storms, the streets are utilized as conduits for run-off from adjacent property. Much of the Region's urban flood damages are directly related to poor storm drainage. The Illinois Division of Water Resources Management lists the following cities as storm drainage problems: Benton, Carbondale, Herrin, Johnston City, Marion, Mt. Vernon, and West Frankfort.

> "A river is a natural entity. Modifications of one of its parameters will force it to either return to its natural equilibrium between (factor of) soil and water or create a new equilibrium. Community facilities designed to accommodate the natural river parameters will be seriously damaged or even destroyed by modification of a major channel. Replacement of bridges, roads, (storm drains, sewers), and other facilities would be necessitated."[3]

Other Structural Measures

At the present time, there is little flood-proofing in the Greater Egypt Region. Communities located upon the Mississippi Bottoms should consider flood-proofing for protection against backwater flooding and seepage. However, should a levee break, the rapid velocity of Mississippi River floodwaters would probably destroy buildings caught in the current. A constant check on the levees to insure their strength is maintained by the levee districts and the Corps of Engineers. An evacuation plan is needed by the levee districts to insure citizens' safety during times of high water and threatened disaster. Cooperation with road authorities is needed to designate roads for emergency usage when there is imminent danger of levee failures.

Urban Redevelopment

Urban redevelopment in the Greater Egypt Region is of limited value in the prevention of flood damages. There are blighted areas on the flood plains of some communities, but most are scattered and would not require a program for their removal. A more significant contribution would be made if storm sewers and land-use regulations were applied.

Policy Development: Non-Structural Measures

Since the non-structural measures now in effect are inadequate to reduce flood damage throughout the Region, a program to strengthen all existing land-use regulations should be considered. Ancillary preventive measures should be promoted as a matter of growth policy.

Zoning

Zoning ordinances and maps should reflect the true flood hazard of the community. Not only is zoning the least costly and most efficient method of flood plain management, but it is also the most essential. Without zoning ordinances, all other structural and non-structural measures are of doubtful viability. Zoning should be done at the county and city level.

Urban Flood Plain Zoning should delineate two districts: the floodway and the floodway fringe. The floodway would represent the flowing channel of the 100-year flood. The floodway fringe would represent the backwater area with the depth of one foot after allowed encroachment and fill on the hundred-year flood plain. The rural areas should designate a single district flood plain zone, the floodway district.

Subdivision Regulations

Lands that are to be subdivided should be required to have storm sewers separate from sanitary sewers as part of the subdivision criteria. Roads should be unacceptable to donation if they are inundated by the 20-year flood or less. Also utilities services should not be provided within floodways, even though utility easements cross flood hazard areas.

Building Codes

Building codes should be adopted and enforced. Many of the existing codes lack the necessary administrative structure for enforcement.

Regional Water Authority

"A Regional water authority should be created to administer the policies governing the policies of water distribution."[4] The authority should not allow the construction of water distribution systems within the flood plains, as these systems are an inducement to development. The authority could also acquire flood plains as part of its functions and could support the growth policy of the Region. Zoning ordinances should act as a guide to the authority for development of the water distribution systems; flood plain zones should be designated for little or no development.

Flood Insurance

Since 1968, flood insurance has been available, subsidized by the Federal government under the National Flood Insurance Program, to private individuals, providing land-use regulations were enforced by a local unit of government. Under the 1973 "National Disaster Protection Act," communities that are identified as having flood hazards by the US Secretary of Housing and Urban Development, but which do not enact and enforce land use regulations providing for sound flood plain management will forfeit all Federal monies except revenue sharing for the special flood hazard area. The funds withheld include any bank or savings and loan mortgage monies if the institution is insured by the Federal government.

All local units of government that are enabled to enact zoning ordinances should seriously consider taking steps to become eligible for flood insurance. The first steps to qualify for the insurance program are a map of what the community believes to be the flood plain and/or a copy of the building permit system the community has adopted. The building permit system can either be by zoning ordinance or by a building code. Due to the technical information needed by an administrator to enforce a building code, a zoning ordinance is recommended as the preferred building permit system. The procedure for entrance into the flood insurance program is outlined in Figures 1a and 1b.

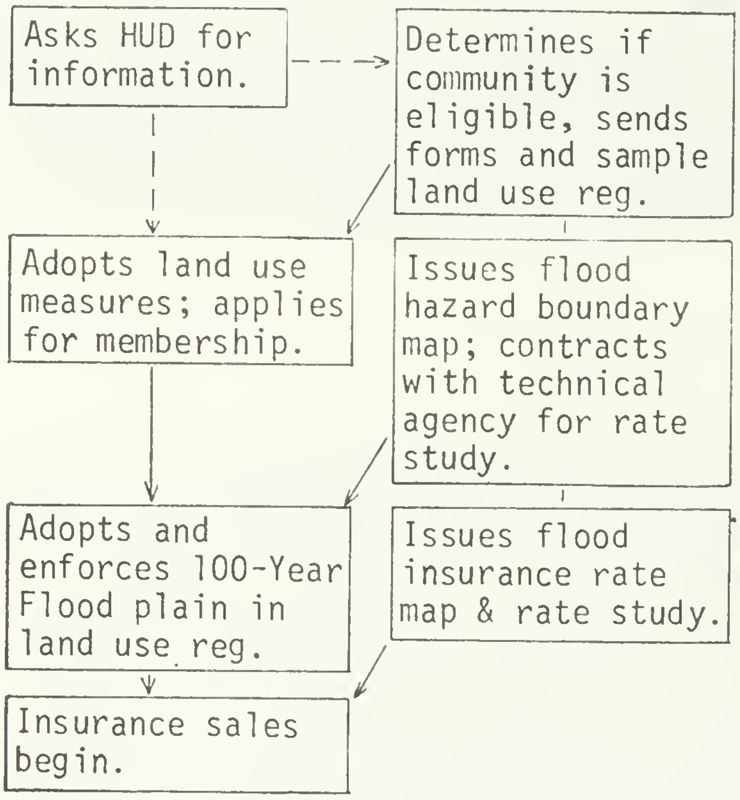
Flood Plain Land Acquisition

Federal, State and Enabled Local units of government should acquire as much flood plain as is recommended in the 1964 Regional Comprehensive Plan.[5] The Council on Environmental Quality reported the experience of the Willamette River Task Force. Located in Oregon, the Willamette River has experienced a gradual lowering of water quality since 1900. In planning to clean up the river, the Task Force had recommended a greenway system of parks, but did not promote a linear corridor on both banks of the river. Instead, the Task Force planned an intermittent series of parks. However, the Task Force soon discovered that ownership of parks did not guarantee access to all the parks from the river. Private landowners along the banks had refused to sign the necessary easement agreements. This left the Task Force and State of Oregon with a series of almost inaccessible parks. In 1972, the State legislature authorized the Highway Commission to acquire more land and scenic easements by eminent domain, if necessary.[6]

The Council on Environmental Quality recommends acquisition not only for navigation, but water quality, wildlife, and recreation purposes as well. The Big Muddy River Basin Plan of 1971 called for an environmental-recreational corridor to deal with similar problems in the Greater Egypt Region. The linear easements, however, should be replaced by acquisition as much as possible,and scenic easements should be provided by eminent domain, if necessary.

Figure 1a

STEPS IN ACHIEVING COMMUNITY ELIGIBILITY FOR INSURANCE SALES AND REGULAR PROGRAM MEMBERSHIP



Community	H.U.D.	Subsidized Insurance	Actuarial Insurance
Asks HUD for information.	Determines if community is eligible, sends forms and sample land use reg.	Not available.	Not available.
Adopts land use measures; applies for membership.	Issues flood hazard boundary map; contracts with technical agency for rate study.	Available for all structures until publication of flood insurance rate map.	Not available.
Adopts and enforces 100-Year Flood plain in land use reg.	Issues flood insurance rate map & rate study.	Available for all buildings, except new construction in hazard zone after publication of rate map.	Available to all structures.
Insurance sales begin.			

Figure 1b

INDIVIDUAL FLOOD INSURANCE COVERAGE: LIMITS, EXEMPTIONS, RATES

Type Policy	Coverage Limits		Exemptions	Rates	
	Subsidized	Regular		Subsidized	Regular
Single Family Residential	$ 35,000	$ 70,000	2% or $200 Deductible, whichever is greater amount.	.25/$100	To be determined by location on flood plain as shown on community flood insurance rate map.
All other structures	$100,000	$200,000		.40/$100	
Contents, Residential	$ 10,000	$ 20,000		.35/$100	
Contents, Non-Residential	$100,000	$200,000		.75/$100	

Minimum Coverage = $25.00

The Action Program

An action program, although derived from alternatives and developmental policies presented in a plan, is not actually an integral part of the plan. In the development of the action program, alternatives and developmental policies are selected and expressed as goals to be achieved; resources are marshaled; priorities established; schedules formulated; and the action program implemented.

It is not the intent of this chapter to present an action program. The action program should involve more than just the Regional Planning Agency. The action program should be developed by the Local units of government directly affected, assisted by Federal and State agencies which have water resources management responsibilities. For this reason only the steps necessary to ascertain the action program will be considered here. The action program should be published later as a separate report.

There have been two previous action programs produced for the flood plains in the Greater Egypt Region. The 1939 program called for creation of many parks and reservoirs. The Big Muddy River Comprehensive Basin Study of 1971 deleted most of the earlier proposed reservoirs. The latter study incorporated the concept of continuous greenbelts on the flood plain of the main stem of the river and its major tributaries. Neither of these studies delineated the flood plain at the scale or with the precision necessary to meet Regional flood plain management needs.

In Greater Egypt Regional Planning and Development Commission's (GERP&DC) Flood Plain Report, a 100-year flood plain delineation process was described using a statistical formula and synthetic cross-sections from 7½-minute United States Geological Survey (USGS) topographic maps. The length of reach covered is more than 60 miles, from Rend Lake Dam to Murphysboro. The river stages were transposed to topographic maps. Although the maps are as accurate as they can be under the procedures used, more detailed, definitive work must be done to determine a precisely delineated flood plain for the entire Region. One benefit of community and county qualification for the National Flood Insurance Program would be completion of such studies at no direct cost to the units of government affected.

Flood plain identification activity should be linked to the land-use planning efforts of the Commission. It will be of prime importance to keep development off the flood plain and at the same time guide future development upon the upland areas. Eventual development of the upland areas will have marked effect on the extent of flooding in the bottomlands.

Regulations and plans for the flood plain are the responsibility of the Local unit of government once the flood plain is identified. To coordinate all flood plain regulation and plans, and also because the Region is essentially a coterminous unit basin, a Regional Water Resources Committee should be created under the auspices of the Regional Planning Commission. This committee would function differently than a proposed Regional Water Authority, in that all aspects of water resources would be considered, not merely water supply and quality. Federal and State agencies should act as resources to assist the committee in deciding upon basin-wide, Regional policies. The Commission staff should act as permanent advisors to the committee. The recommended composition of the committee should be the Regional Water Authority, the two river conservancy districts, the county and municipal zoning commissions, the soil and water conservation districts, and elected members of the county boards and commissions (or their respresentatives). Federal and State agencies' personnel should sit with the committee as non-voting members. Federal and State agencies should not develop discretionary, unilateral plans of action between themselves and private citizens or groups without first commenting to the Regional Water Resources Committee. The committee should report their findings and recommendations to the Commission. The final approval of water resources flood plain management and action programs should rest with the Commission.

A failing of earlier action programs was the lack of involvement by Local units of government. Earlier programs had been formulated by Federal and State agencies with assistance from the Local units of government. The Local units of government were represented on the Big Muddy River Basin Coordinating Committee (1971) only by the Regional Commission. Under the proposed Regional Water Resources Committee, the Local units of government would be given the opportunity to make their interests known.

At the present time there are 15-20 Federal agencies and an equal number of State agencies dealing with water resources.[7] There are dozens of Local units of government engaged in water resources planning and management within the Region. Clearly an orderly process should be developed to utilize the Region's water resources in a Comprehensive Flood Plain Management Action Program.

Previously proposed action programs have failed to present adequate alternatives to proposals. Very little mention was made of land use regulations as being effective in a flood plain management program; yet it is through enforcement of such regulations that flood damage reductions are most likely to be attained.[8]

In order to assure the preparation and implementation of adequate flood plain management and action programs, a review similar to that under Circular A-95 from the Office of Management and Budget is needed to evaluate Federally-assisted projects, for flood hazard and other environmental impacts. The State of Nebraska is using a review procedure to guarantee that flood plain developments will meet the State's requirements under its Flood Plains Regulation Act.[9] Iowa has also adopted a review system under the Iowa Natural Resources Commission which may issue permits for flood plain projects and which has final approval of all municipal and county zoning ordinances in regard to the use of flood plains.[10]Under Illinois law, the Division of Water Resources Management has the review permit responsibility and is to "define flood plains within the State of Illinois on a township by township basis and may issue permits for any construction within such flood plains,--shall publish and distribute suitable reports, together with mapping and hydrologic exhibits pertaining to flood plains as defined and established under this Act. In defining applicable flood plains,--shall cooperate with and shall consider planning and zoning requirements of regional planning agencies created by statute, counties, municipalities, and other units of government."[11](A bill is currently pending to strengthen and simplify these management responsibilities.)

In calling for a Regional review, the Regional Planning Agency is recognizing two important facts. First, the Region constitutes a single and unique hydrologic unit which can and must be considered in all future planning. Second, the developments on and off the flood plain will be determining factors in future flood damage totals. By recognizing these two factors and starting a review process,the Region should be able to effect reduction of future flood damage and enhance the environmental and economic factors for future growth.

Summary of Flood Control Related Agencies, and Their Powers and Responsibilities

A summary of the flood control powers, duties, and responsibilities (as well as actions to date) of governmental agencies and units of Local government which operate within the Greater Egypt Region is furnished on the following pages.

Federal Agencies

U.S. Army, Corps of Engineers, has general responsibility for flood control and is empowered to plan, construct, own, operate and maintain structural and non-structural methods of flood control, and to construct structures to be owned by Local units of government. The only structures built by the Corps of Engineers specifically for flood control within the Region are the levees along the Mississippi and Big Muddy Rivers in Jackson County. Rend Lake is a Corps of Engineers project; it is primarily a water supply and recreational lake, and no flood regulation program is involved. The Corps of Engineers makes Flood Plain Reports to municipalities and other Local units of government through its Flood Plain Management Services. Technical services in flood damage prevention planning are also provided.

U.S. Department of the Interior--Bureau of Sports Fisheries and Wildlife administers Crab Orchard National Wildlife Refuge. Design and plans of operation of Crab Orchard Lake and its two feeder lakes preclude more than incidental flood regulation. Draw-downs are primarily for fish management; the primary purposes are for fish, wildlife, and public recreation.

U.S. Department of Agriculture--Soil Conservation Service is empowered to assist soil and water conservation districts, together with other units of government and special purpose districts, having flood control and flood damage prevention responsibilities. Soil and water conservation districts operate in every county in the Region. Soil Conservation Service action is channeled through the districts to co-sponsoring Local units of government in the form of technical and financial assistance. Assistance is provided for construction of structures, channel work and land treatment with conservation measures authorized under the Watershed Protection and Flood Protection Act of 1954. Four watersheds within the Region have submitted proposals for assistance. Applications for assistance under P.L. 566 for Upper Crab Orchard and Middle Fork Big Muddy River have been terminated due to adverse economic or engineering feasibility. Cedar Creek Watershed was terminated because other than Soil Conservation Service assistance was obtained and a structure larger than the limits under P.L. 566 was built. An application for assistance with a project on the Upper Big Muddy has been approved by the Governor of Illinois and a Preliminary Investigation Report is pending.

U.S. Department of Housing and Urban Development, Federal Insurance Agency, designates communities as flood prone and administers the subsidized National Flood Insurance Program, including the engineering studies involved in production of Flood Insurance Rate Maps.

State Agencies

Illinois Department of Transporation--Division of Water Resources Management is the principal agency within State government with flood control responsibilities.[12] The Division establishes priorities among requests to the Corps of Engineers Flood Plain Management Services. The Division plans and constructs State flood control projects. The The Division works with the State Water Survey in defining flood plains. The Division constructed Kinkaid Lake and several channelization projects within the Region, including work at Carbondale and at West Frankfort.

Illinois Department of Registration and Education--The Illinois State Water Survey does the technical work and compiles the State-wide flood plain maps cooperatively with the Division of Water Resources Management.

Illinois Department of Agriculture--The Bureau of Soil and Water Conservation administers the State Soil Conservation Districts Law (1937) and provides financial, administrative and program planning guidance to the Local soil and water conservation districts. The Bureau has review responsibilities over applications for P.L. 566, Watershed Protection and Flood Prevention Projects.

Local Units of Government

Counties are empowered to plan and implement programs for flood control and prevention. County highway construction can involve flood plain modifications which can influence flooding. County Boards or Commissions can be indirectly involved through influence on the policies of special purpose districts by use of the power to appoint representatives to governing bodies of those districts which have direct flood related responsibilities. Counties can play a direct role in flood damage reduction through flood plain zoning, building codes and subdivision regulation. To date no County has adopted flood plain zoning and none of the existent building codes or subdivision regulations provide adequate protection from flood damage.

Municipalities have broad regulatory powers over flood plain development, though none of the municipalities in the Region has an entirely effective flood damage protection program. Cities are empowered to construct dams, channels, and diversions; zone the flood plain; establish subdivision regulations; enforce building codes; and acquire flood plain land.

River Conservancy Districts have direct statutory authority to govern river and flood control, drainage, conservation, sanitation, and recreation and develop water supplies. Conservancy districts can plan, construct, manage and maintain structural and non-structural flood control works, and can promulgate regulations by ordinances enforceable through the courts. Flood plain land can be acquired, utilized and developed for flood resistant or flood compatible purposes. There are three river conservancy districts in the Region--Kinkaid and Reeds Creek, in Jackson County; Rend Lake Conservancy District, in Franklin and Jefferson Counties; and the Saline River Valley Conservancy District, in southeast Williamson County. None of these districts has acted to directly address the overall flood control and flood damage problems.

Soil and Water Conservation Districts have responsibilities in planning, sponsoring and assisting projects and programs which can be primarily or incidentally involved in flood plain management. Under the Watershed Protection and Flood Prevention Act P.L. 566 these districts are to be co-sponsors of any projects funded under the act. The districts cooperate with private owners of land to establish conservation practices such as contouring, terraces, ponds, reforestation, erosion control, revegetation and other practices which encourage rainwater to percolate into the ground and otherwise retard peak runoff. Soil and water conservation districts have the power to adopt and enforce land use regulations; however, no district in Illinois has chosen to exercise that power, and the process of adoption requires a district (county)-wide referendum. The districts have the power to initiate petitions, hold hearings, and conduct referenda to establish sub-districts to sponsor specific watershed-related projects. The sub-districts have taxing and bonding powers.

Levee and Drainage Districts have the power to plan, construct, operate, and maintain levees, ditches, pumping stations, and flood walls. Within the Region two levee and drainage districts operate a common system of modern levees and are currently awaiting funding of pumping plants. These districts assess taxes on the acreage of land benefited for construction and maintenance of the protective works of the district.

Summary

The three basic elements of flood plain management were found to be (1) identification of the flood plain; (2) enforcement of preventive measures; and (3) review, up-dating and re-identification. Identification is the first step to be taken and should be initiated as soon as possible. Identification of the flood plains, based on engineering studies, should be conducted on all major streams and in important urban areas. Review, updating and re-identification need to be provided for in flood plain management programs, as land use changes and other developments have hydrologic effects which can change flood-producing characteristics.

It is noted that the 1964 Regional Comprehensive Plan for the Greater Egypt Region provided that the flood plains of major Regional drainage systems be made "greenbelts" to provide recreational lands within the "dispersed city."[13] The Big Muddy River Comprehensive Basin Study, 1968-71, also reserved the flood plains of the river and major tributaries as "recreational corridors" for public use and access, either by private ownership with easements or by public ownership.

Development policies recommended, based on the true nature of the flood problems in the Greater Egypt Region, are the following:

1) Emphasis and reliance should be placed on the non-structural measures, such as land use regulations, zoning, subdivision regulations, building codes, land acquisition, and land treatment, rather than on structural measures such as dams, levees and channel work.

2) Zoning based on the 100-year flood should be done by all appropriate units of Local government.

3) Subdivision of flood-prone land for residential development should be prohibited.

4) Building codes should be adopted and enforced by all appropriate units of Local government.

5) All flood plain studies should be done on the 100-year and the 10-year flood basis to meet the requirements for community flood insurance eligibility.

6) Further study should be undertaken to determine the feasibility and the mechanisms of developing the "green-way," "greenbelt," or river corridor and dedicating that part of the flood way to recreational use.

The Local units of government should oversee any action programs regarding flood plain management within the Region. To accentuate the position of these governments, a permit and review committee should be created at a Regional level. The Region is largely one hydrological unit, and the effects of one unit's plans will be felt by other units. Rather than continue the fragmentary flood plain management of the past, the permit and review committee should be under the auspices of the Regional Planning and Development Commission as part of its Water Resources program.

FOOTNOTES

[1] Illinois State Planning Commission, The Big Muddy River Basin Plan, Chicago, Illinois, 1934.

[2] East-West Gateway Cordinating Committee, Gateway Council Report, V. 5 #1, St. Louis, Missouri, 1973.

[3] Council on Environmental Quality, Report on Channel Modifications, Part I and II, Washington, DC, 1973.

[4] Greater Egypt Regional Planning and Development Commission, Regional Water and Sewer Study, No. 158, Carbondale, Illinois, 1969.

[5] Greater Egypt Regional Planning and Development Commission, The Comprehensive Plan for the Greater Egypt Region, No. 33, Carbondale, Ill., 1964 (Revised May, 1976).

[6] C.R. Goldman, et al, Environmental Quality and Water Development, W.H. Freemans' Company, San Francisco, Calfornia, 1973.

[7] Illinois Economic and Fiscal Commission, Water Resources Management in Illinois, Springfield, Illinois, 1974.

[8] C.R. Goldman, op. cit.

[9] Ibid.

[10] Merwin Dougal, ed. Flood Plain Regulations: Iowa's Experience, papers presented at Sixth Water Resources Design Conference, Iowa State University Press, Ames, Iowa, 1969.

[11] State of Illinois, Illinois Revised Statutes, 1973, Chapter 19, Section 65F.

[12] Illinois Economic and Fiscal Commission, op. cit.

[13] The Comprehensive Plan, op. cit.

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